

A century of influence: Part 1. Orthodontic pioneers



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The story of orthodontics during the first 100 years of *Journal* publication can be told through the people who lived it. As part of the *American Journal of Orthodontics and Dentofacial Orthopedics'* Centennial Celebration, we present 100 people who most influenced the specialty during the last 100 years. Part 1 describes the orthodontic pioneers who were born in the 1800s. They were broadly educated in the sciences, and most studied orthodontics with Angle, Dewey, or Lischer. They were innovators and inventors, and they laid the foundation of the specialty during the early years of the 20th century. (Am J Orthod Dentofacial Orthop 2015;147:S155-60)

The story of orthodontics during the first 100 years of *Journal* publication can be told through the people who lived it: the men and, in a few cases, women who laid the foundation of the specialty during the early years of the 20th century, those who built on that foundation in the decades that followed, and those who helped the specialty thrive in the first years of the new century. As part of the *American Journal of Orthodontics and Dentofacial Orthopedics'* Centennial Celebration, we present 100 people who most influenced the specialty between 1915 and 2014. In Part 1, you will find the orthodontic pioneers, born before 1900 and making their mark during the first half of the 20th century; later installments will cover those born in the 20th century. The final section will feature a few women whose contributions did not rise to the level of "most influential," but they studied, practiced, and taught orthodontics when few women were doing so, and their accomplishments influenced the specialty in a different but important way.

The honor for being the first-born person on our list goes to a man who was not an orthodontist. The discovery of x-rays in 1895 by the German scientist William Conrad Roentgen (1845-1923) would reverberate not just through orthodontics, but through medicine,

industry, and modern life. He received a Nobel Prize for his discovery in 1901.¹

Calvin Suveril Case (1847-1923) was born in Michigan and enlisted in the U.S. Army on his 17th birthday to fight in the Civil War.² After the war, he enrolled at the Ohio Dental College and became the first in the state to graduate in dentistry. He also earned a degree in medicine. He wrote extensively on orthodontic topics and was especially eloquent on the prosthetic correction of cleft palate. For good or ill in orthodontics, he will always be remembered for daring to disagree with Edward H. Angle in the "great extraction debate."^{3,4}

The "father of modern orthodontics," Edward H. Angle (1855-1930), needs no introduction.⁵⁻⁷ He was a man of great intellect and strong opinion. He was a pioneer in the field, and in those early years, his name was nearly synonymous with orthodontia. He developed new appliances and techniques, wrote books and scholarly articles, and educated nearly the entire generation of orthodontic specialists.

Just a few years Angle's junior, Ohio-born Charles Augustus Hawley (1861-1929) studied with him in 1905 and then became the first orthodontist in Washington, DC.⁸ Like all of Angle's students, he was well versed in the sciences, including anatomy and biology. He also had a mechanical ability that allowed him to innovate and invent; he was one of the first clinicians to give patients nitrous oxide before extracting their teeth, and the Hawley retainer is still used today.

Rodrigues Ottolengui (1861-1937) learned about orthodontics as an apprentice, first with Dr Albert Kimball and later with Norman Kingsley.^{9,10} In 1906, he was

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elected president of the American Society of Orthodontists (now the American Association of Orthodontists [AAO]), becoming the first person not taught by Angle to hold the post. He campaigned tirelessly to eliminate charlatans and illegal practitioners, and he did not shy away from the occasional battle with Angle. He edited dental journals for more than 40 years and was one of the first to introduce a section devoted to orthodontics. He also wrote mystery novels. According to Wahl,¹¹ the *Saturday Review of Literature* called him the “dental counterpart of England’s physician-crime solver, Sir Arthur Conan Doyle,” and Ellery Queen described him as “one of the most neglected authors in the entire history of the detective story.”

Another nonorthodontist to make the list, Edmund H. Wuerpel (1866–1958), was an artist who taught and directed the School of Fine Arts at Washington University in St. Louis.^{12–14} He was also Angle’s friend and taught in his schools as well. He infused orthodontics with an esthetic sensibility.

John Valentine Mershon (1867–1953) was a generous, unpretentious man. After studying with Angle in 1908, he limited his Philadelphia practice to orthodontics.¹⁵ Believing that biology would always trump mechanics, he favored tooth movement through gentle pressure. He studied relapse and developed the Mershon lingual arch—the first “invisible” appliance. He did not patent his appliance, wanting it to remain affordable. He taught seminars in his office and later at universities, and accepted no payment for these services. Recognizing his value as a teacher, the AAO established the John Valentine Mershon Memorial Lecture in 1960.

Emil Herbst (1872–1940) lived and worked in Germany and will be remembered for the functional appliance that bears his name. He developed it around 1905 and published several articles in the *Journal* in the 1930s.^{16–18} The appliance fell out of favor until the 1970s, when Hans Pancherz began using it to treat patients. Pancherz et al¹⁹ are now reporting data from a 32-year follow-up of these patients.

Another European who gave his name to an appliance, Viggo Andresen (1870–1950), specialized in orthodontics in Denmark.²⁰ Although the Andreasen activator was not well received initially, it is widely available today.

When he contracted tuberculosis as a young man, Albert Ketcham (1870–1935) moved from New England to Colorado, hoping that the high-altitude air would be better for his health. It was, and it invigorated his mind as well. He studied with Angle in 1902 and was an early advocate of x-rays. He installed a laboratory in his office

and delivered a paper on x-rays in 1910; later, he used the technology to study root resorption. Some of Ketcham’s thinking ran counter to Angle’s, but he worked quietly and modestly, always adhering to the Golden Rule.²¹ He was so admired that within a year of his death, the Albert H. Ketcham Award for outstanding contributions to the art and science of orthodontics was established. Mershon was the first recipient in 1937, and it has been awarded annually by the AAO ever since.

In 1939, the Ketcham Award was presented to Milo Hellman (1872–1947). Hellman had immigrated to the United States from Romania as a teenager, and he played the flute in a symphony orchestra to finance his education.^{22,23} His wide-ranging interests in biology and anthropology led him to believe that most orthodontic problems were biologic. Like a few others of his day, he challenged some of Angle’s prevailing views.

Anna Hopkins Angle (1872–1957) is the only woman on the list of 100. A schoolteacher at age 16, she became Angle’s secretary at 21 and, eventually, his editor, collaborator, and wife.²⁴ She studied dentistry at the University of Iowa and orthodontics with Angle. She was a founding member and the first secretary of the Society of Orthodontists, and she was the first editor of the *Angle Orthodontist*. Known to many as “Mother Angle,” she frequently calmed the waters that Angle roiled and encouraged the students demoralized by her exacting husband.

Frederick B. Noyes (1872–1961) worked for Angle as a summer intern in the 1890s.²⁵ He attended the Angle School and taught for a time, but he believed orthodontic education needed a firmer, broader foundation. He taught orthodontics at the University of Illinois and in 1926 was named dean of the university. Next to education, histology was his passion. He wrote *Textbook of Dental Histology and Embryology*, a standard for more than 45 years, and Graber²⁵ said that “photomicrography was literally born in the Noyes bathroom, kitchen, and improvised darkroom on Chicago’s South Side. As Mrs. Noyes jokingly commented, ‘Every tub has a silver lining.’”

Alfred Paul Rogers (1873–1959) was the son of an inventor and shipbuilder; he grew up on Canada’s Bay of Fundy, where he developed a lifelong interest in nature and conservation.²⁶ Sometimes called the “father of myofunctional therapy,” he advocated muscular exercises to improve neck, head, and tongue posture and encourage nose breathing, and he produced a color motion picture to teach patients “stimulating and corrective exercises ... for use before, during, and after appliance treatment.”

Axel F. Lundström (1875–1941) was a legendary leader and innovator in the fledgling specialty in Europe. He traveled from Sweden to St. Louis to study with Angle

in 1907, and he was a founder of the European Orthodontic Society.²⁷

Another prominent European, Albin Oppenheim (1875–1945), was a physician and dentist, and Austria's royal family called on his skill as an orthodontist.²³ He studied with Angle, taught at his New London, Connecticut, school, and Angle trusted him with the translation of the seventh edition of *Malocclusion of the Teeth*. He was named head of orthodontics at the Dental Institute of the University of Vienna but fled to Switzerland in 1938. A year later, he was in the United States, invited by Spencer Atkinson to teach at the University of Southern California. He published widely and reported that root resorption was unavoidable in orthodontic treatment.²⁸

The contribution to the specialty of another nonorthodontist, Charles Virgil Mosby (1876–1942), cannot be overstated. He was a physician who went into publishing, and he was instrumental in creating the *International Journal of Orthodontia* (now the *American Journal of Orthodontics and Dentofacial Orthopedics*) and sustaining it through the early decades of operation. Although the Mosby Company eventually merged with larger publishers, the Mosby imprint is still respected in health care publishing today.

When Angle turned down the invitation to edit Mosby's new journal, Martin Dewey (1881–1933) accepted the challenge. Dewey had been one of Angle's earliest students, earning his certificate in 1902.²⁹ He edited the *International Journal of Orthodontia* from 1914 to 1931, adding "*Oral Surgery and Radiography*" to its name along the way. Through some early lean years, he filled many pages himself, but with the help and support of Mosby, the *Journal* eventually flourished. Dewey taught at schools around the country, including the University of Iowa, and also established his own school, the Dewey School of Orthodontia, which he moved from Kansas City to Chicago and, finally, to New York.

The third private orthodontic school operating during the early decades of the 20th century was started by Benno Edward Lischer (1876–1959). Lischer lived in St Louis when he sought admission to Angle's School.³⁰ Before enrolling him, Angle asked Lischer to agree that he would not practice in St Louis; Lischer refused, and in 1907 he opened the International School of Orthodontia. A wordsmith among his many other talents, he was the first (in 1922) to use the term *cephalometrics*, and he preferred the terms mesiocclusion, distocclusion, and neutroclusion to Angle's Classes I, II, and III.³¹

According to Lischer, the German scholar and clinician Paul W. Simon (1883–1957) was a "pioneer on the frontier of scientific dental orthopedics; in his thought and understanding, he was always in advance

of his colleagues." He studied philosophy, medicine, and dentistry at the University of Berlin. After graduating, he met a well-known specialist, Dr Alfred Korbitz, and was himself inspired to specialize. His books and articles were required reading for German orthodontists. In a memorial notice published in the *Journal*, Lischer wrote: "The years following World War II heaped unusual hardships on Dr. Simon: the loss of his fine practice, his home, his library, and his teaching. Nevertheless ... his life was a personification of Goethe's immortal line: 'In der Beschränkung zeigt sich erst der Meister'" (In limitations, the master shows his skill).³²

Robert H. Wright Strang (1881–1982) planned to specialize in oral surgery but, after studying with Angle in 1906, switched to orthodontics.³³ He was respected for his skills as a clinician, an educator, and an author, and he advocated the Tweed technique. He inaugurated a 2-week continuing education course at Columbia University that continued until 1946. His *Textbook of Orthodontia*, published in 1933, became a standard. He was a centenarian, dying at 101.

Harvey Carlyle Pollock, Sr (1884–1970), studied with Angle in 1911 and then associated with Ketcham in Denver, before landing in St Louis. He had recommended Dewey for the job of editor-in chief of the new *Journal* in 1914; when Dewey stepped down, Pollock became the *Journal's* second and longest-running editor-in-chief (1932–1968). He also led the American Society of Orthodontists with a calm but sure hand during some turbulent years of transition. In the clinic and the classroom, he held that orthodontic problems stem from genetics and the environment and could not be resolved by mechanics alone.³⁴

The name Bernhard W. Weinberger (1885–1960) was also closely associated with the *Journal*. He was a dental and orthodontic historian, librarian, and writer, and his articles filled many early *Journal* pages.^{35,36} His series, "Evolution of orthodontia and steps in its development," ran for 36 consecutive issues, from 1915 to 1918.

T. Wingate Todd (1885–1938) was fascinated by growth, especially bone growth, and most especially by that of the mandible.³⁷ He thought that the problem of mandibular growth was "one of the most elusive, though important, of all skeletal problems." He x-rayed more than 4500 children throughout their growth periods and established standards of normal growth and development. He also introduced the Case Western Reserve University density gauge, a tool for measuring bone density. His study of bone age culminated in a 1937 atlas of hand x-rays.³⁷

Spencer Roane Atkinson (1886–1970) taught for a time at Angle's School in Pasadena and, like Angle,

possessed broad knowledge and skill.³⁸ His collection of 1500 skulls is now housed at the University of the Pacific School of Dentistry in San Francisco. He was a skilled photographer. He developed the universal bracket in 1929 (it was introduced in 1937). Believing that the new bracket was too similar to his appliances, Angle shunned him. Atkinson donated all of his profits from the popular appliance to the California Institute of Technology, and the machine shop that milled the first universal brackets gave rise to the Unitek Corporation.

Oren A. Oliver (1887-1965) was respected for his leadership roles in organized dentistry and in civic life.³⁹ He was the first orthodontist to receive the Pierre Fauchard Academy medal, and he received orthodontics' highest recognition, the Ketcham Award. He served many years as president of the Tennessee State Board of Health.

In 1913, after 2 years of general dental practice in Louisville, Kentucky, Joseph E. Johnson (1888-1969) took the Dewey course.⁴⁰ He practiced orthodontics for the next 55 years, until just before his death. He was a pioneer in the use of light wires to move teeth, and he put in long hours perfecting his twin-wire technique, which he introduced in 1929.

Ernest Sheldon Friel (1888-1970) taught orthodontics at the University of Dublin for 50 years.⁴¹ He was the first dentist in the British Isles to specialize in orthodontics, and in 1960 he became the first person from outside the United States to receive the Ketcham Award.

By the time Viennese-born Harry Sicher (1889-1974) received his Ketcham Award in 1967, he had been in the United States for nearly 30 years, one of the many who fled Hitler's march through Europe.⁴² He was classically educated as a physician and anatomist. He emphasized the sutural theory of bone growth, and his work helped orthodontists to better understand growth of the head, neck, and face. In presenting the award, American Board of Orthodontics president Nathan G. Gaston described him not only as the best known and most highly respected anatomist in dentistry, but also as a "raconteur without peer, a master of the English language, one of the most modest men I have ever known." In 1976, the First Research Essay Award was renamed in his honor, and today, the Harry Sicher Research Award is given to the author of a first research paper of unusual merit.

Austrian Karl Häupl (1893-1960) was a pathologist and periodontist who rejected fixed appliances and promoted the activator, notably the Andresen-Häupl activator.²⁰

Hays N. Nance (1893-1964) worked in an Arizona copper mine until a serious injury required him to find another line of work.⁴³ He chose dentistry and graduated

from Northwestern University Dental School in 1919. He went to Denver and was associated with Ketcham for several years before moving to Pasadena. He was a meticulous clinician and investigator; his landmark article, "Limitations of orthodontic treatment," was more than 10 years in the making and appeared in the *Journal* in 1947. In it, he reported that treated dentitions return to their original intercanine and intermolar widths after treatment. He defined leeway space and reported that it could be saved with a space maintainer in a borderline extraction patient.

Although Birdsall Holly Broadbent, Sr (1894-1977), did not give his name to an appliance or technique, he is so closely associated with one aspect of orthodontics that he well could have. From his earliest studies at the Angle School, he was interested in the possibilities promised by x-rays. He wondered whether images taken at different times could be superimposed to show changes during orthodontic treatment, and this became his life's work. He collaborated with Todd at the Department of Anatomy at Case Western Reserve University in Cleveland to design a craniostat to standardize x-rays of dry skulls, and then he adapted that device so that it could be used on living subjects: the cephalometer was born. He collected data on the cephalic development of 800 children in a study sponsored by the Brush Foundation, laying the groundwork for a valuable collection that is still used today.⁴⁴

George Bernard Crozat (1894-1966) was a New Orleans orthodontist and southern gentleman. Seeking an esthetic nonextraction treatment approach, he developed the Crozat appliance.⁴⁵ In 1940, he bought a crumbling mansion near Baton Rouge, thinking it would make a nice summer house. He restored it, and today the Houmas House Plantation is a popular tourist attraction.⁴⁶

While serving in the Navy during World War I, George Walter Hahn (1894-1977) was assigned duties at a dental station.⁴⁷ After the war, he attended the University of California College of Dentistry. He studied with Angle in 1921 and remained devoted to Angle's ideals and philosophies. Like Angle, he demanded perfection from his students, but his warmth endeared him to them. In the 1930s, he helped establish and ran the Curriculum II orthodontic program at the University of California at San Francisco; in the 1960s, he was chairman of the AAO Preceptorship Qualifying Committee.

Charles H. Tweed (1895-1970) created a stir when he questioned Angle's proscription of extractions. But he amassed records of 100 consecutive patients whose nonextraction treatment had failed but whose subsequent extraction treatment led, in many cases, to a good outcome. He considered his diagnostic triangle

to be his greatest contribution, and orthodontists around the world still travel to Tucson to learn the Tweed technique.

When Cecil C. Steiner (1896-1989) first applied to Angle's School in Pasadena, he was turned away because he was not familiar with Charles Darwin.⁴⁸ He returned better prepared, and this time he excelled. His article describing the Steiner analysis, a step-by-step approach to cephalometrics, was published in 1953.

After practicing dentistry for a few years in the small logging town of Monroe, Washington, Paul D. Lewis (1896-1992) went to New York to attend the Dewey School of Orthodontics.⁴⁹ He worked as Dewey's assistant for a time, and then he returned to Washington to practice orthodontics. He taught courses for the Tweed Foundation in Arizona and in 1948 was one of the founding faculty members of the University of Washington Department of Orthodontics.

Many an orthodontic pioneer gave his name to an appliance, but the name of Allan Gibson Brodie (1897-1976) is synonymous with a bite. After studying with Angle, Brodie was invited by Noyes to come to the University of Illinois in Chicago.⁵⁰ There he studied anatomy and growth of the head and worked to relate his findings in the laboratory to the daily practical problems of orthodontics. He was chair of the graduate orthodontic department for 36 years and is admired as one of the great orthodontic educators of the 20th century. Today, the term "Brodie bite" is often used synonymously for scissors crossbite.

Paul Raymond Begg (1898-1983) was born in Australia and came to the United States to study under Angle.⁵¹ He worked with Angle on his new edgewise appliance and, after returning to Australia, developed his own bracket—a modified version of Angle's old ribbon arch. In the 1940s, he worked with a metallurgist in Melbourne, and the result was a highly resilient, stainless steel "Australian" wire. He studied "anatomically correct occlusion" and wrote a long article on Stone Age man's dentition, which was published in installments in the *Journal* in 1954. He brought all his work together in the multiloop light-wire Begg technique, and his book, *Begg Orthodontic Theory and Technique*, was published in 1965. He practiced orthodontics for more than 55 years and registered his last patent at age 84.

William B. Downs (1899-1996) was a member of Brodie's first class (1930) at the University of Illinois, and later he joined the faculty there.⁵² He was a coauthor of another classic text, *Cephalometric Appraisal of Orthodontic Results*, published in 1938. His landmark

study of facial relationships resulted in the Downs analysis, the first cephalometric analysis that could be applied clinically.

Lester Bodine Higley (1899-1990) was a pioneer in cephalometric radiography.⁴⁸ He used standardized profile roentgenograms as early as 1931, and he used radiography to study the temporomandibular joint and the hard and soft tissues. He invented a head positioner and cassette holder (1936) for use with a cephalometer, and he was a frequent contributor to the *Journal*.

CONCLUSIONS

The orthodontic pioneers born before 1900 were broadly educated in the sciences. They were innovators and inventors. Many studied with Angle, Dewey, or Lischer, and then made their own marks on the orthodontic departments that were opening up at universities across the country. Their backgrounds were varied, but together they laid the foundation for a new dental specialty.

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